



**SPACE OPTICS MANUFACTURING
TECHNOLOGY CENTER**



MSFC Coating Facilities

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Large Aperture Coating Facility



- 5.5-Meter Cylindrical Vacuum System
 - 4.57 m diameter x 2.64 m clear zone w/o platform
 - Cryo-pumped + LN₂-trapped roughing pumps
 - Vacuum bake via quartz lamps
 - Cooling via LN₂ cooling shrouds
 - Deposition Sources:
 - Electron beam evaporation
 - Resistive evaporation
 - Sputtering sources (In storage/not yet installed)
- HEPA-filtered room surrounding the chamber door



Large Aperture Coating Chamber (*Photograph 1*)



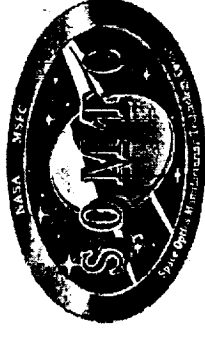


Large Aperture Coating Chamber (*Photograph 2*)





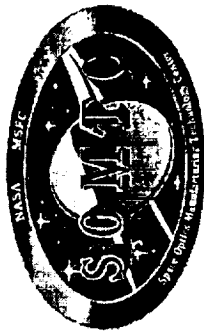
Optical Coating Facility



- Balzers BAK-760, Ion-Enhanced e-Beam System
 - Cryo-pumped, 760-mm box-style chamber
 - Rotating 700 mm diameter sample holder
 - 4-pocket Temescal electron beam evaporation source
 - Denton CC-105 broad, gridless ion source
 - GSM-420 Optical Monitor
 - 200 nm to 3200 nm wavelength
 - In-situ witness chip changer (140 chip capacity)
- CVC Diffusion-Pumped Belljar System (18")
 - Resistive evaporation

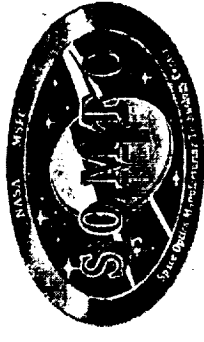


Balzers Coating System (*Photograph 3*)





Coating Accessories



- FilmStarTM) Optical Thin Film Design Software
 - Optimization for reflectivity, transmission, absorption, & reflected or transmitted phase
- Acton Spectrometer Equipment
 - UV (~185 nm) to approximately 10 microns
- Chandra Coating Hardware
 - 60" Sputtering sources & controllers
- Rotatable Sputtering Sources
 - Airco C-Mag design, 2 each
 - 76 mm OD x 304 mm useable



Sample of Recent Coating Activities



- Vacuum Evaporated Metals
 - Mirrors on metal, glass & polymers
 - Constellation-x mandrels
 - Largest coated: 500 mm diameter x 600 mm length
- Evaporated Dielectric Multilayers
 - Anti-reflection coatings (VIS, NIR)
 - Cold mirrors
 - w/ non-polarizing, high-efficiency reflecting region
 - Beamsplitters
- Evaporated Metal-Dielectric Multilayers
 - Protected metal reflectors and multi-bandpass filters



Additional Interests



- Large Aperture Coatings (Large Aperture Coating Facility)
 - For optics > 2.6 m diameter, two options:
 - Orient optical face vertical and sputter coat
 - Orient face horizontal w/ new chamber extension
 - Sputtering required for vertically-mounted optics & preferred for all large optics
 - Can raster multiple targets across substrate w/ 2-axis motion control system
- Low-Stress Mirror Coatings
 - May be required for thin substrates



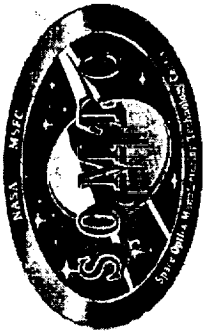
Other Potential Interests



- Unusual Bandpass/Multi-bandpass Filters
- Near-UV Dielectric Mirrors
 - Multi-band-reflecting cold mirrors
- Exotic Coating Material R&D



Design/Fabrication Example



32-Layer Dielectric Cold Mirror
Fabricated July 16, 1997

